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Review of Spanish Discard information of megrim (*Lepidorhombus whiffiagonis*) in ICES Sub-areas VI , VII and Div. VIIIabd.

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Resume

Trawlers Spanish discards obtained on board commercial vessels in Sub-areas VI and VII in 1988, 1989, 1994, 1999-200-2004 are present to:

1. Validate the discard estimation of megrim onboard comparing length distribution of retained fish on board with landed fishes.
2. Compare estimation megrim discarded following two methodologies: primary sampling unit as hauls or as fishing trips. Examine possible modification on discards estimations in years where results obtained by different methods were relevant.
3. Analyse possible differences in discard patter along the sampled period

Introduction to the Spanish Discard Sampling (Brief History)

Spain started sampling discards on board commercial vessels in 1988, more specifically the Spanish trawl fleet operating in Sub-areas VI and VII was firstly target. In 1989, the following study devoted to discard was carried out for the same areas and fleets. During 1994, other fleet (long liner (EC Project: Pem/93/005)) was attempted to be sampled for discard. Sampling discards continued during 1999, 2000 for IV, VII, VIII and IX (EC Project: 98/095) and in 2001, partly just for cephalopods and during the first and last quarter of the year. Since 2002 and under the National Sampling Programs, Spain continues sampling discards on board commercial fleets.

Until 2003, the standard procedure used for calculation of the Spanish discards estimators was based on a haul basis as described by Trenkel (2001). However, although these procedures were applied, there was not an estimate of the error and variance in every step of the analysis. Errors were only estimated on a haul basis.

From 2003 onwards and following the recommendation of the Workshop on Discard Sampling Methodology and Raising Procedures held in Charlottenlund (Denmark) in 2003 (Anon, 2003), general guidelines on appropriate sampling strategies and methodologies were described and then, the primary sampling unit was defined as the fishing trip instead of haul.

Objectives

The objectives of this working document are:

1. Validate the discard estimation of megrim onboard comparing length distribution of retained fish observer onboard and raising to the landing values, with those lengths from landings used in the Working Group on Hake Monk and Megrin (WGHMM).
2. Compare estimation of Spanish megrim discard in Sub-areas VI and VII between years 1988 to 2001 following both methodologies: primary sampling unit: hauls and fishing trips.
3. As Megrin in Sub-areas VI and VII and Divisions VIIIabd is a stock subject to a full analysis (a benchmark assessment) in the 2005 WGHMM, to examine possible modification on discards estimations in years where result obtained by different methods were relevant.
4. Analyse possible differences in discard patten along the sampled period and discuss possible reason for those differences, if any.

Material and Method

Spanish discard information came of the different Fishery Unit, which comprises area, gear and target species. Table 1 present annual discards sampling level on board for areas used in this paper. Discard volume and precision level is also presented in Table 2. Castro et al. (2003) and Santurtún et al. (2003) established a more appropriate definition of the Spanish trawl fleets which can be useful in mixed fisheries management. Nevertheless discard sampling level is small for applying separately by these Units for the Galician case.

The mostly traditional gear is the òBakasö Otter trawls. In the middle of the 90's new gears started operating in these areas. With this information, different Fishery Units were identified in Spanish fleets fishing in ICES Sub-areas VI, VII, and Divisions VIIIab (Pérez in Lart, 2002, Santurtún et al. 2003).

Traditional òBakaö Otter trawls

- 1 Baka Otter trawls targeting megrim (around 35% of total retained weight) anglerfish and hake, operating in Sub-areas VI & VII.
- 2 Baka Otter trawls targeting hake (20-40% of total retained weight), witch, anglerfish and Nephrops, operating in Sub-areas VI & VII.

The fisheries deployed in the Basque Country:

- 3 òBakaö bottom trawlers fishing in the ICES Sub-area VI targeting blue ling and witch.
- 4 òBakaö Otter trawlers fishing in the ICES Sub-area VII targeting anglerfish and megrim.
- 5 òBakaö Otter Trawlers fishing in the ICES Div. VIIIabd targeting a great variety of species (mixed fisheries).

The new gears

- 6 ðBakaö Otter trawl operating with Very High Vertical Opening (VHVO) nets.
- 7 Traditional Pair trawls.
- 8 Pair trawls operating with VHVO nets.

The observer programme is carried out based on stratified random sampling per Fishery Unit, which comprises area, gear and target species.

The initially ideal of random vessel/trip sampling, that it is not always possible to obtain in other fisheries, it is perfectly achieved in these areas, due mostly to the cooperation of the industry.

Following the recommendation of Workshop on Discard Sampling Methodology and Raising Procedures, Charlottenlund, Denmark, 2003 (Anon, 2003) the primary sampling unit was defined as the fishing trip instead of hauls, which was used until 2001.

Two raising methods are routinely applied to the whole time series of Spanish discards: raising by landings weight and raising by effort in number of trips. Raising discards by landings is usually more suitable to the Spanish information due to the lack of information concerning the Spanish fleet operations in some areas, especially in relation to the fleet effort as day and hours. However, for some of the Basque fisheries defined for the raised procedures effort is also used as data are ready available for those fisheries. However, results showed in this working document are just for the estimation related to landings.

Adjusted logistic retention curves (% retained by length) of megrim were used to show different in discard patter along the sampled period. Maximum likelihood method was used to adjust the data.

Result

To validate the truthfulness of the Spanish discard estimation onboard in relation with landing value, length distribution of retained fish observer onboard and raising to landing values were compare with those length from landed used in WGHMM that came from market samples (Figure 1a). Results are very similar except for values obtained in 2000. This year was the first in which the reduction of the MLS from 25cm to 20cm was applied (Commission Regulation nº 850/98). As most of the differences came from sizes less than 25 cm this variation could reflect differences on on-board discards processing by the crew with observers on board due to doubt about the new MLS.

In Figure 1b comparison between years and gears for "Baka" Otter trawlers in Sub-areas VI-VII and Divisions VIIIabd of the Basque component of the Spanish fleet are presented. As it can be seen length distributions of megrim in the three fisheries studied are quite different. Just one fishery targets Megrim ðBakaö Otter trawls and so length distributions are the most robust of the series.

If we compare the estimation of megrim discard following both methodologies of estimation (primary sampling unit as hauls and as fishing trip) result are very similar

except for years 1989 and 2000 (Figure 2). In 1989, differences were due to error in length distribution used to estimate discard by landings. Year 2000 estimation of discard using hauls as the primary sampling unit was also separated by quarter. In Figure 3 is shown how discard estimated in second quarter was extremely high created an overestimation of the annual discards when is added to the rest of the quarters. No comparison between both methods is presented for the Basque fisheries and so just data based on trips is presented from 2002 to 2004.

In 2005, and as megrim in Sub-areas VI, VII and Div. VIIIabd is a stock subject to a full analysis (a benchmark assessment) in the WGHMM, it is important to examine possible modification on discards estimations in years when results obtained by different methods are different. A new estimation on Spanish discard based on trips as primary unit was used replacing the previous one based on hauls as primary unit (years 1989 and 2000). In 1989, combined ALKs for 1989 and 1990 were used for age conversion. This decision was taken because the previous conversion was made with French ALKs based on scales reading.

Adjusted logistic retention curves (% retained by length) of megrim were used to reflect differences on on-board discards processing by the crew along the sampled period (Figure 4). Four stages are observed along the discard sampling period:

- a) 1988 and 1994 were the mean length size of 50% of retention is around 20 to 21cm.
- b) 1999 were enforcement of the MLS had pushed the 50% length of retention till 25cm (current MLS).
- c) Years 2000 and 2001, length size of 50% of retention start to move back slowly to 20cm, the new MLS.
- d) Year 2004, probably following the abundance of small fish 50% of retention decrease to around 17cm.

In relation to the Basque fisheries no ogives of retention were adjusted. The reason for that was that length distribution of retained and discarded fish did not overlap. Thus, logistic curves were not possible to be adjusted as lengths distributions had a very conspicuous jack knife shapes.

The reason for these distributions is the way fishermen work fish when they get on board. In Sub-areas VI & VII, fishermen use marks in their conveyor site at 21 and 27 cm (MLS for megrim and hake) and so retained catch is exactly separated in legal and illegal sizes. The reason for not adjusting this logistic curve to the length distribution in Division VIIIabd is due to the mixed nature of this fishery that makes that length distribution of megrim lacks of continuity.

An important point to be comments is that in 2004, and probably following the abundance of small fish, Galician Fishing Industry had a initiative to reduce the number of small fish landed. Ship-owners were forced with an auto-quota per ship to reduce a number of small fish landed for human consumption.

Conclusions

Length distribution of retained fish observed onboard and raising to landing values were similar with those length from landed used in WGHMM that came from market samples for most of fleet analysed, except for 2000 year due to some bias in estimation of discards due to first year in the implementation of MLS.

In 2005 and due to the fact that megrim in Sub-areas VI, VII and Div. VIIIabd is a stock subject to a full analysis (a benchmark assessment) in the WGHMM, to examine possible modification on discards estimations in years when result obtained by different methods are very different is something to be carried out. Both methodologies of discard estimation (primary sampling unit being hauls or trips) give similar results, except for 1989 and 2000. Modifications of these years are here presented to the WGHMM. Values estimated with primary sampling unit as fishing trip are more reliable.

Despite of the new smaller MLS (20cm), market prices, and high abundance of small fish have forced the increase of the length of 50% of retention to more than the MLS.

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Table 1. Annual discards sampling level and observation effort on board.

	Trips	Sampling Hauls	Fishing hours
1988	14	371	1 949.8
1989	8	236	1 291.9
1990 -1993	NO DATA		
1994	20	703	3 665.2
1997 -1998	NO DATA		
1999	6	230	976.2
2000	12	388	1 648.9
2001	3	111	512.1
2002 AZTI	7	130	1160*
2003	9	327	1 531.2
2003 AZTI	17	313	1434*
2004	11	400	1 630.1
2004 AZTI	17	341	1546*

(*) Fishing hours are estimated as 6 hours trawling for VHVO Pair trawls and 4 hours trawling for ðBakaö Otter trawls.

Table 2. Megrim discard (in tonnes) of Spanish trawlers. Raising to landings.

	Sampling Unit as Hauls (t)	Sampling Unit as Fishing Trip (t)	Fishery	CV
1988	245	286		31.7
1989	722	705		43.0
1990 -1993				
1994	473	521		17.2
1997 -1998	NO DATA			
1999	3 135	2 744		29.0
2000	2 265	1 033		31.9
2001	1 275	1 020		35.4
2002	NO DATA			
2003		3 147		22.9
2004		4 511		34.4
2002 AZTI		N.A		N.A
2003 AZTI		0.06	Baka VI	160
		60	Baka VII	69
2004 AZTI		42	Baka VII	45

Figure 1a. Megrim (*L. whiffiagonis*) in Sub-areas VI-VII. Trawl annual length compositions of Spanish WG estimated landings and Retained value estimated by observers on board.

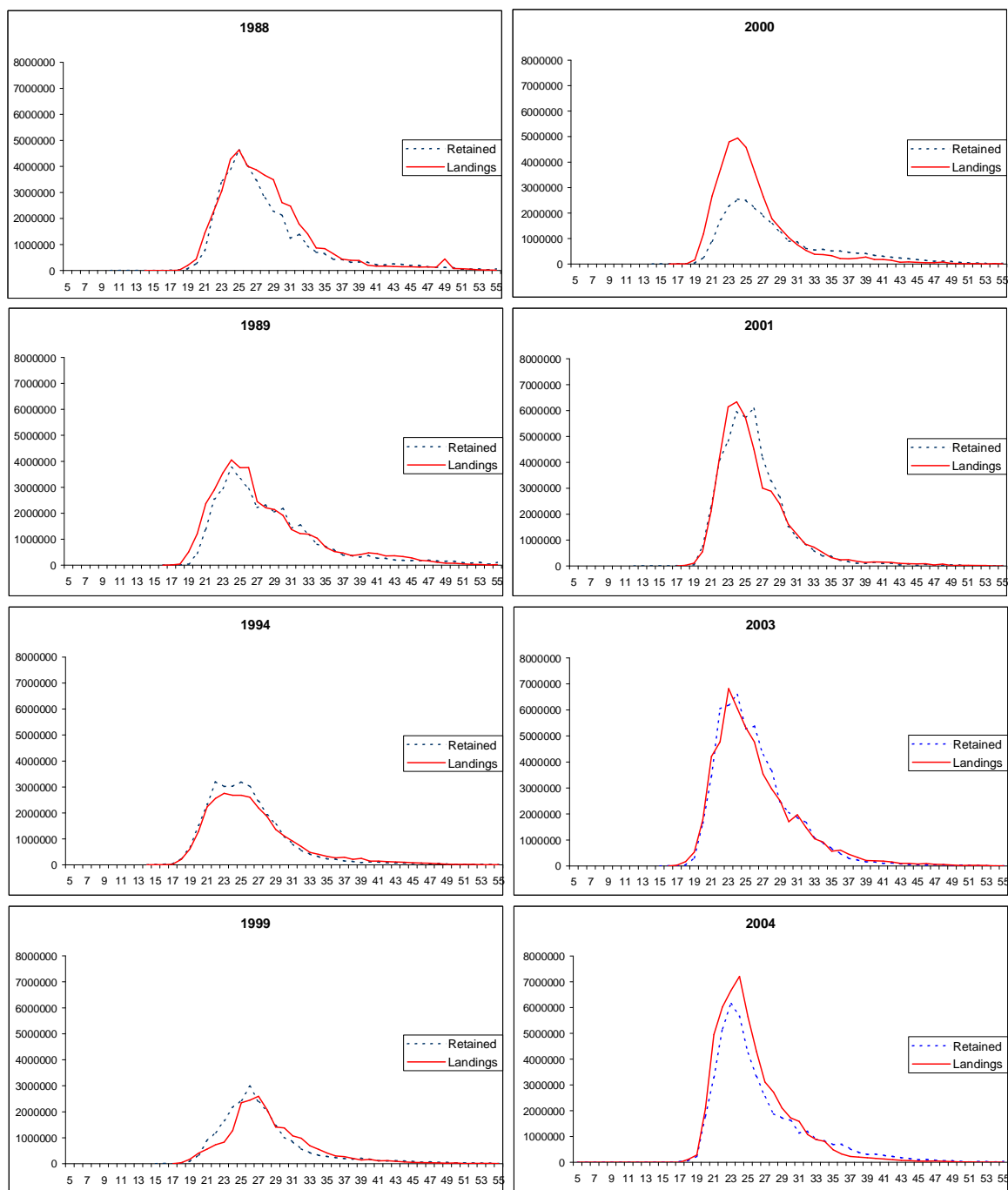


Figure 1b. Annual Megrim (*L. whiffiagonis*) in "Baka" Otter trawlers in Sub-areas VI-VII and Divisions VIIIabd. Trawl annual length compositions of The Basque component of the Spanish estimated landings.

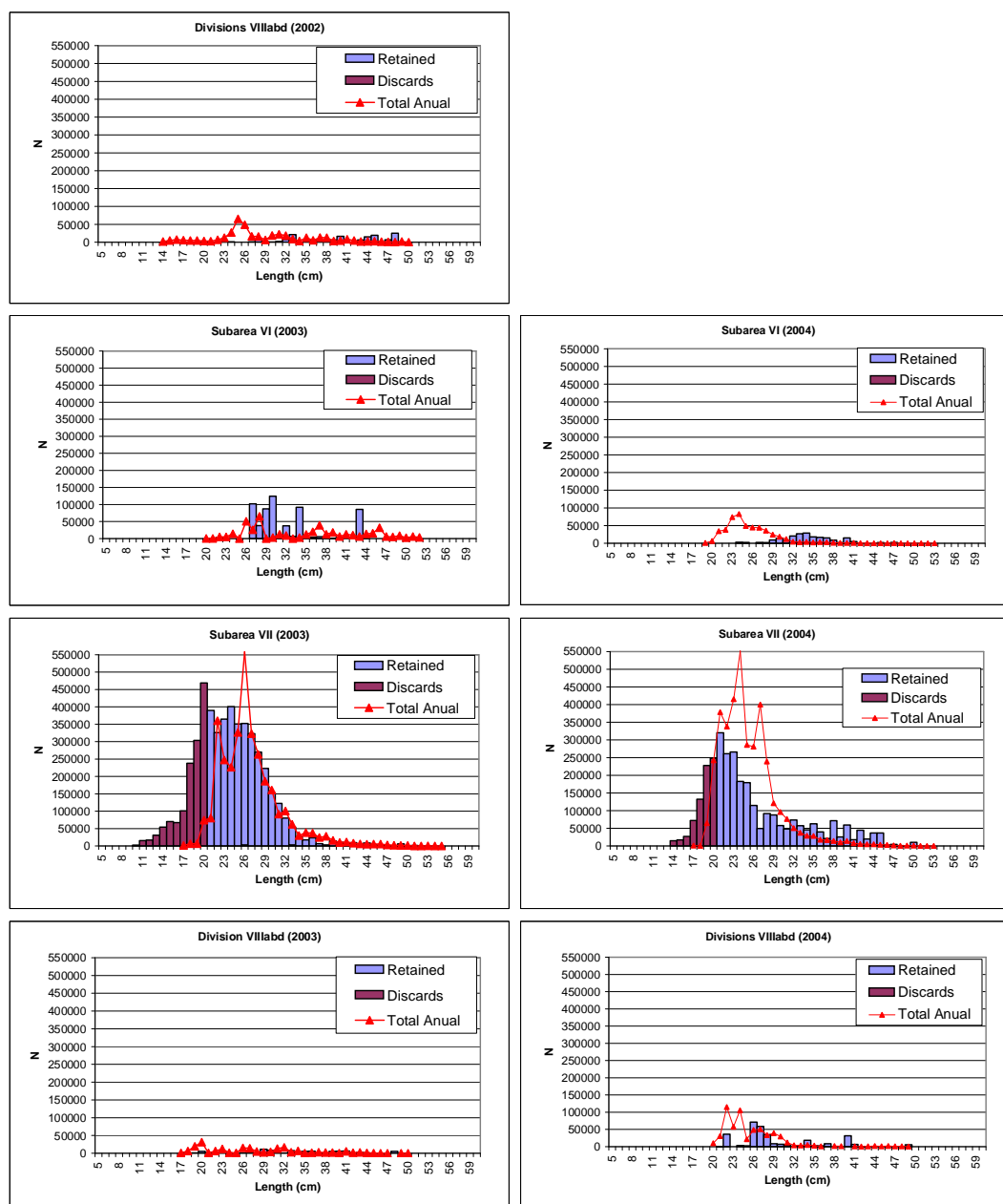


Figure 2. Length Distribution of Spanish Discards of megrim in Divisions VI and VII estimated by Haul and by Trip as Sampled Unit.

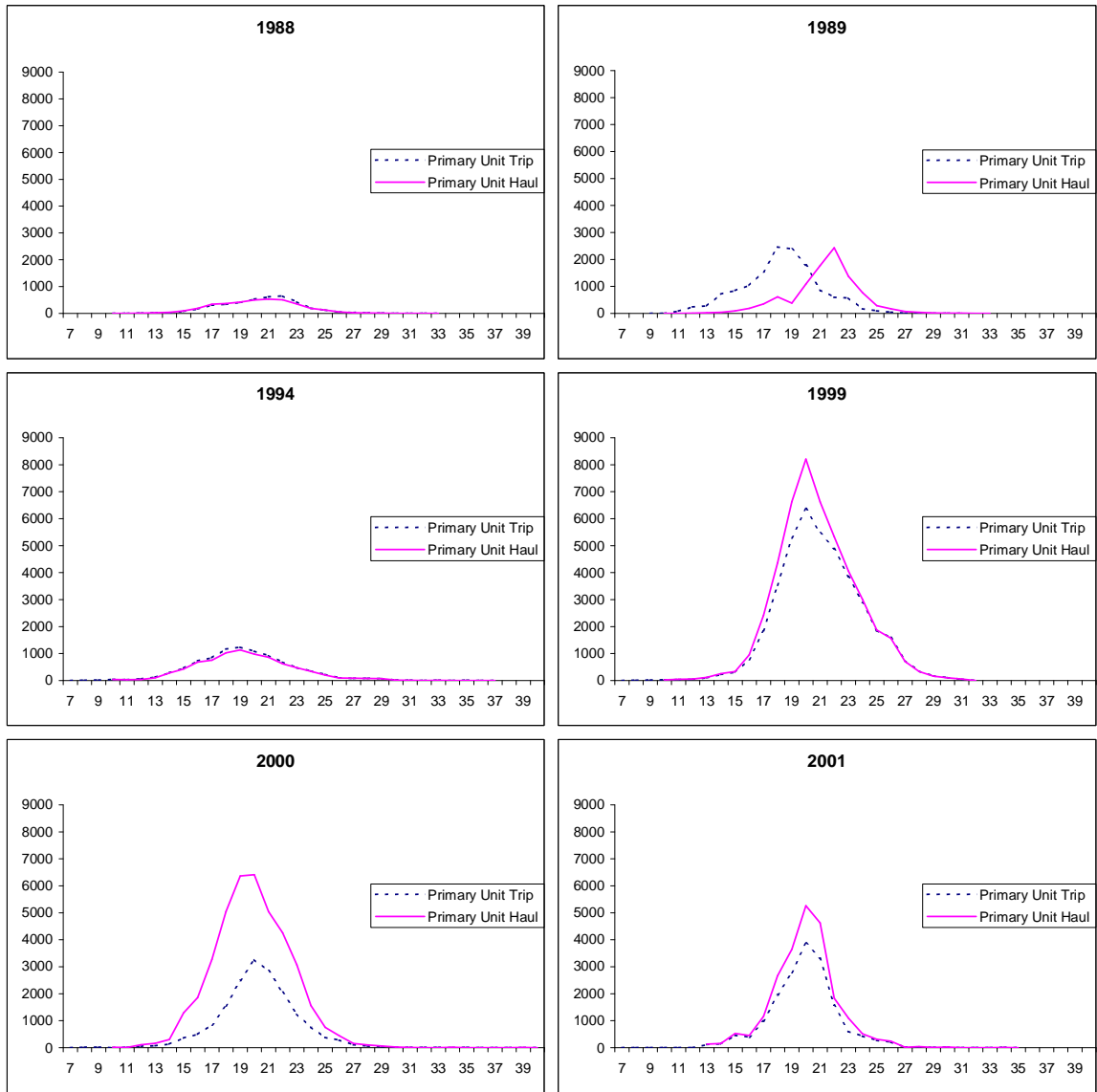


Figure 3. Length distribution of Spanish discards of megrim in 2000 estimated by quarter and haul Sampled Unit.

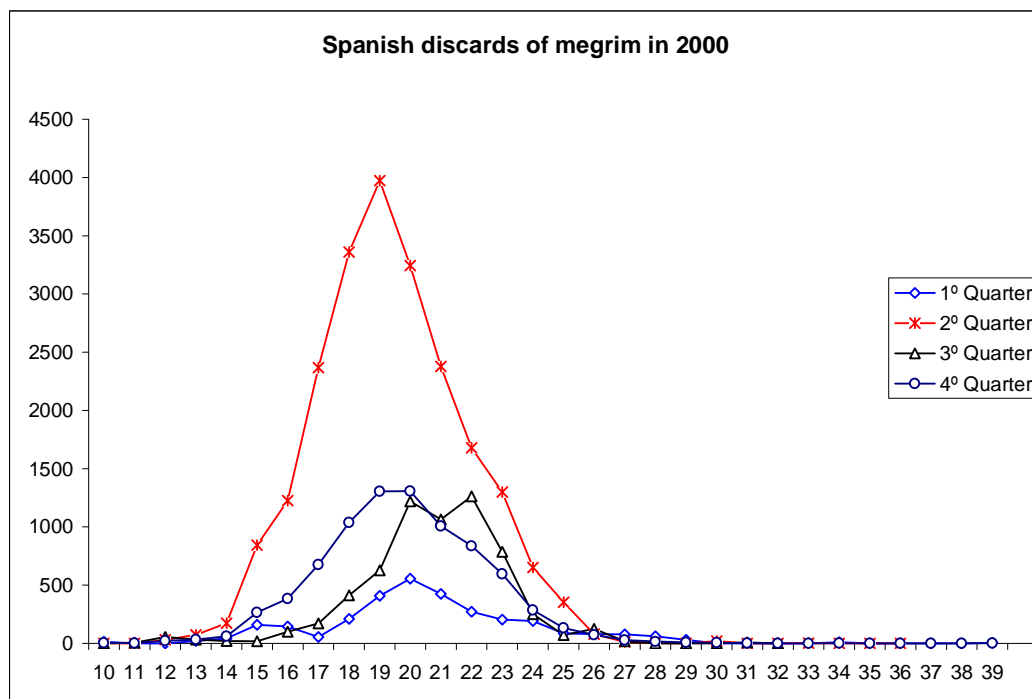
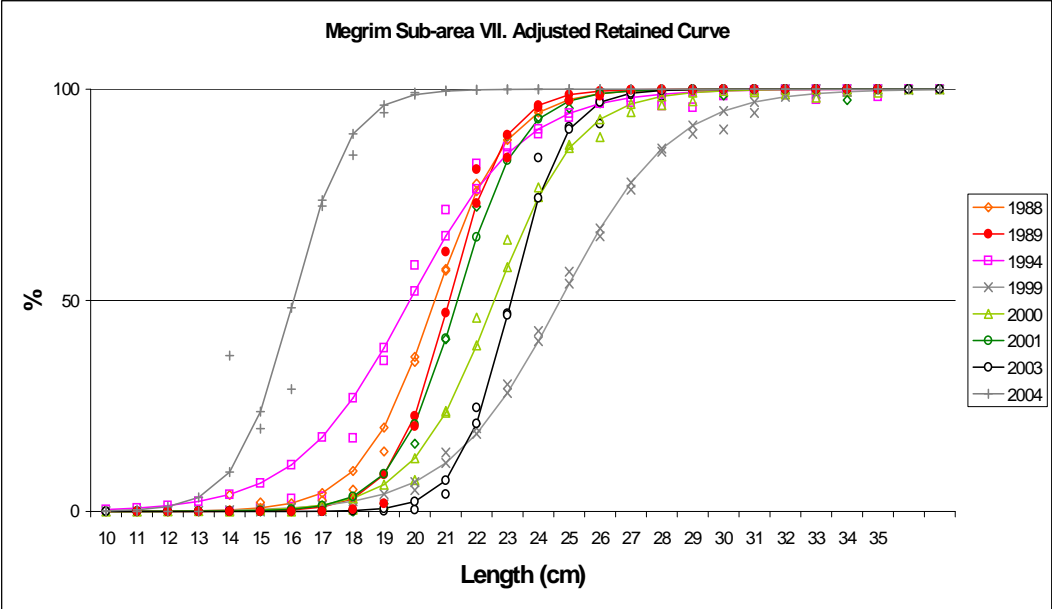


Figure 4. Adjusted logistic retention curves (% retained by length) for megrim in Sub-areas VI and VII by observers on board.



L50=(-A/B)	
1988	21.1
1989	21.6
1994	20.3
1999	25.2
2000	23.1
2001	21.9
2003	23.6
2004	16.6